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A NORMATIVE SURVEY OF READING ACHIEVEMENT OF ALBERTA CHILDREN IN RELATION TO INTELLIGENCE, SEX, BILINGUALISM, AND GRADE PLACEMENT

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF EDUCATION

THE UNIVERSITY OF ALBERTA
FACULTY OF EDUCATION

BY

WILLIAM HENDRY COULL

JANUARY, 1956

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Appreciation is extended to the teachers, principals, and educational leaders of Alberta whose cooperation made this survey possible. Finally, the writer wishes to express thanks to the following persons for their help in the completion of the work: Mrs. I. E. Wells, Mr. T. J. Reid, and the wife and family of the writer.

SYNOPSIS

This investigation compared the reading achievement of Alberta school children in relation to intelligence, sex, bilingualism and grade placement. Five samples were randomly selected from eight geographical areas of the province representing various ethnic, socio-economic and educational backgrounds. The testing instruments used were the California Short-Form Test of Mental Maturity and the appropriate California Reading tests for grades four and seven.

Scores obtained on the tests were tabulated on data assembly sheets. The mean Total I.Q. and mean Total Reading scores were used for statistical treatment. The relationship between reading achievement and intelligence was investigated by computing the coefficients of correlation for each of the five samples. Differences in reading achievement between sexes and between lingual groups were tested for significance. Provincial mean scores were computed for reading comprehension, vocabulary and total reading. The corresponding grade placements were compared with the established norms of the testing instruments.

This study provided evidence that a significant positive relationship exists between reading achievement and intelligence. In comparing the sexes, no significant difference was found in intelligence or reading achievement. Monoglot pupils were found to obtain significantly higher reading scores than bilingual pupils. A naive comparison of grade placement scores reveals that Alberta pupils enjoy a slight superiority over the normalizing group in reading achievement.

TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCING THE PROBLEM 1

II. RELATED STUDIES 4

Reading Achievement and Intelligence 4

Reading Achievement and Sex Differences 9

Reading Achievement and Bilingualism 15

Reading Achievement and Grade Placement 18

III. EXPERIMENTAL DESIGN 20

The Sample 20

The Testing Instruments 22

Experimental Design 26

IV. READING ACHIEVEMENT AND INTELLIGENCE 29

Summary of Findings 33

V. SEX DIFFERENCES 34

The Sample 34

Intelligence 35

Achievement in Reading 39

Variability 40

Summary of Findings 42

VI. BILINGUALISM 45

The Sample 45

Intelligence 46

CHAPTER PAGE

VI. BILINGUALISM (Continued)

Achievement in Reading 48
Variability 49
Summary of Findings 51
VII. READING ACHIEVEMENT AND GRADE PLACEMENT 52
Grade Placement 53
Summary of Findings 55
VIII. CONCLUSIONS 56
IX. IMPLICATIONS 58
BIBLIOGRAPHY 60

LIST OF TABLES

TABLE PAGE

I. Coefficients of Correlation of Intelligence Quotients with Reading Factors 6

II. Coefficients of Correlation Between Reading Scores and I.Q. Scores 8

III. Sex Differences in Silent Reading in the 1940 Iowa Every-Pupil Tests of Basic Skills 13

IV. Sex Differences in Reading on the 1940 Iowa Every-Pupil Tests of High School Achievement.. 14

V. Sample Sizes of Pupils Participating in Alberta Reading Survey 21

VI. Correlation Between Reading Achievement and Intelligence of Five Sub-Samples of Grade VII Alberta Students 30

VII. Reliability of Correlation Coefficients when Tested Against the Null Hypothesis 31

VIII. Significance of Difference Between Correlation Coefficients 32

IX. Comparison of Mean Scores in Intelligence and Reading of Grade VII Boys and Girls 35

X. Significance of Differences of Mean Scores in Intelligence and Reading of Grade VII Boys and Girls 36

XI. Comparison of Standard Deviation for Boys and Girls 41

XII. Significance of Differences Between Standard Deviations for Boys and Girls 41

XIII. Comparison of I.Q. Mean Scores of Grade VII Monoglot and Bilingual Pupils 47

TABLE PAGE

XIV. Significance of Difference of Total I. Q. Mean Scores of Monoglot and Bilingual Pupils.. 47

XV. Comparison of Reading Mean Scores of Grade VII Monoglot and Bilingual Pupils 48

XVI. Significance of Difference of Mean Total Reading Scores for English and Bilingual Samples 49

XVII. Comparison of Standard Deviations for English and Bilingual Samples 50

XVIII. Significance of Difference of Standard Deviations for Total I.Q. and Total Reading Scores Obtained by English and Bilingual Pupils 50

XIX. Reading Achievement of Grade Four and Seven Alberta Students 52

XX. Combined Means, Standard Deviations and Corresponding Grade Scores of Alberta Reading Scores. 54

XXI. Growth in Reading Achievement in Terms of Grade Placement from Grade Four to Grade Seven 54

LIST OF FIGURES

FIGURE PAGE

I Differences in Reading Age Among Children of Successive Chronological Age Groups 11

2. Distribution of Total I.Q. Scores Attained by Random Samples of Alberta Boys and Girls in Grade VII 37

3. Distribution of Total Reading Scores Attained by Random Samples of Alberta Boys and Girls in Grade VII 38

CHAPTER I

INTRODUCING THE PROBLEM

Since 1880 more than twenty-seven hundred scientific studies related to reading have been published in the United States and England. During the last three decades an unprecedented interest in reading problems has resulted in a great increase in the number of investigations reported and in the range of problems studied. The ever-increasing body of knowledge of reading has brought about many changes in curricula and educational procedures.

The acquisition of reading skill is basic to scholastic growth. In terms of instruction time in the classroom, reading demands equal attention with language or mathematics. Indeed, the classroom teacher will attest to the fact that a part of the instructional time of such subjects as social studies, science or health is devoted to guidance in reading development. Skill in reading is a major consideration in elementary school promotion policy. Because the importance of reading has changed little during the years many parents are prone to evaluate their children's progress in school in terms of their reading achievement. Continuous evaluation of reading achievement is necessary to effect adjustment of instruction to the abilities and needs of pupils.

A number of studies in the reading field have been completed in Alberta but few have been province-wide in scope. In 1953,

Dr. G. M. Dunlop and Dr. R. E. Rees of the Faculty of Education undertook the direction of a project to gather data concerning the language arts in Alberta schools. They worked with the assistance of the Research Committee of the University of Alberta and the approval of the Department of Education. Their efforts have resulted in the collection of data that have become useful in many studies in the language-arts field. Three major studies have been completed to date. The status of reading achievement in Alberta schools was investigated by Miss Anne Carmichael.[1] The second and third studies to be completed were the study of language achievement in Alberta schools by Mr. G. Conquest[2] and a survey of language achievement of Alberta school children in relation to bilingualism, sex and intelligence by Mr. T. J. Reid.[3]

The general purpose of the present study is to contribute in some measure, to the improvement of reading instruction. The recognition of individual differences emphasizes and demonstrates the importance to educational achievement of such factors as intelligence, sex differences and native language. The specific purposes of this

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[1] A. Carmichael, A Survey of the Achievement of Alberta School Children in Reading, University of Alberta, Edmonton, 1954.

[2] G. R. Conquest, A Survey of English Language Achievement in Grades Four and Seven in Selected Alberta Schools, University of Alberta, Edmonton, 1954.

[3] R. J. Reid, A Survey of the Language Achievement of Alberta School Children in Relation to Bilingualism, Sex, and Intelligence. University of Alberta, Edmonton, 1954.

study are to determine the relationship of intelligence, sex and bilingualism to reading achievement. An additional purpose is to present data that will determine the status of reading achievement of Alberta students in terms of grade placement. The problems may be stated as follows:

1. What relationship exists between reading achievement and mental ability?

2. How do boys and girls compare in reading achievement?

3. Does the language spoken in the home bear any relation to the reading achievement of pupils?

4. What is the status of Alberta pupils in reading achievement as measured by grade scores?

CHAPTER II

RELATED STUDIES

1. Reading Achievement and Intelligence

Most of the leading authorities in the field of reading instruction recognize intelligence as an important factor in reading ability. Dolch[1] claims that the degree of intelligence is the strongest single factor in the child's success in reading. This assertion is supported by Gray[2] on the basis of Eugent Hilton's findings that the first factor that influences reading efficiency is the mental maturity or intelligence of the reader, which correlates more highly with reading ability than any other factor studied thus far. Strang[3] writes that the coefficients of correlation between reading test scores and scores on group tests of mental ability are usually above .50.

A Canadian study compared mental ages and intelligence quotients of 205 grade one pupils with their reading achievement. For mental age and reading ability the coefficient of correlation was found to be .50. A coefficient of .53 was computed when the relationship between the intelligence quotient and reading ability score was investigated.[4]

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[1] Edward W. Dolch, The Psychology and Teaching of Reading, New York, Ginn and Company, 1931. P. 139.

[2] Wm. S. Gray, Reading in General Education, Washington, D.C., American Council on Education, 1940. P.36.

[3] Ruth E. Strang, Improvement of Reading in High School and College, Lancaster, Penn., Science Printing Company, 1940. p.31.

[4] ---"Predicting Reading Achievement in the First Grade," Toronto, Educational Research Series No. 9, 1945. p.6.

Gavinchuk,[5] working with junior high school students, discovered significant relationships between reading achievement and intelligence. He found that at the junior high school level coefficients of correlation were positive and ranged from .30 to .61 when intelligence quotients were compared with reading vocabulary raw scores. Comparison of intelligence quotients and reading comprehension raw scores of the same groups produced positive coefficients of correlation ranging from .39 to .60.

Several investigations involving reading factors and intelligence are reported from the United States. Barbe and Grilk[6] found coefficients of correlation ranging from +.12 to +.72 in comparing intelligence with various reading factors. Their results are summarized in Table I.

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[5] M. N. Gavinchuk, A Comparative Study of the Relation of Academic Achievement and Certain Intelligence Tests at the Junior High School Level, University of Alberta, 1954.

[6] Walter Barbe and Werner Grilk, "Correlations Between Reading Factors and I.Q.," School and Society, LXXV, 1952. p.134.

TABLE I

COEFFICIENTS OF CORRELATION OF INTELLIGENCE QUOTIENTS WITH READING FACTORS[7]

Reading Factor Tested	r
Reading Rate	.12
Reading Comprehension	.55
Directed Reading	.65
Poetry Comprehension	.57
Word Meaning	.69
Sentence Meaning	.63
Paragraph Comprehension	.64
Use of Index	.57
Key Words	.65
Total Reading	.72

It may be noted that of the ten factors studied the most significant relationship was found to be between total reading and intelligence. These findings support the results of the Canadian studies cited.

Abbott[8] is reported to have found that an increase in the silent reading ability of grade nine students was accompanied by a significant increase in intelligence as measured by the Kuhlman

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[7] Ibid. p.135.

[8] Ruth E. Strang, op. cit., p. 34.

test. Hawthorne[9] points out that because a high correlation between reading test scores and intelligence test scores has been found it does not mean that intelligence test scores are dependent upon reading rate. His investigation of the problem involved testing a group in reading and intelligence. This was followed by a period of remedial reading. A second testing revealed that although the reading rate doubled no significant changes were found in intelligence scores. This finding corroborates the finding of Barbe and Grilk[10] regarding reading rate.

McCullough, Strang and Traxler[11] suggest that the relationship between intelligence and reading is more complex than it appears. Traxler investigated the relationship of reading achievement to the language and non-language factors of intelligence. Strang conducted an experiment using the Elementary Series of the California Test of Mental Maturity with children in elementary grades. The results of their investigations are summarized in Table II.

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[9] Ibid., p. 35.

[10] Walter Barbe and Werner Grilk, op. cit., p. 134.

[11] Constance M. McCullough, Ruth M. Strang and Arthur E. Traxler, Problems in the Improvement of Reading, New York, McGraw-Hill Book Company Inc., 1946. p.56.

TABLE II

COEFFICIENT OF CORRELATION BETWEEN READING SCORES AND I. Q. SCORES[12]

California Test of Mental Maturity with	Language Factors of I.Q.	Non-language Factors of I.Q.
Iowa Silent Reading Test	.685	.356
Traxler Silent Reading Test	.753	.357
Thorndike - McCall Reading Test	.824	.557
Gates Silent Reading Test Type A	.805	.359
Gates Silent Reading Test Type B	.799	.413
Gates Silent Reading Test Type D	.844	.514

Strang suggests that facility in the use of verbal symbols and in the apprehension of relationships may be the common basis of both intelligence test scores and reading scores.

In this study of the Alberta school population the relation of reading achievement to total I.Q. is investigated. The total I. Q. score is a composite of the language and non-language I.Q. scores. The total reading score is a composite of the total reading vocabulary

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[12] Ibid., p. 59.

and reading comprehension scores.

2. Reading Achievement and Sex Differences

Most research workers have found that girls are superior to boys in reading achievement. Carroll[13] reports that girls excel boys in reading readiness tests as well as tests of reading achievement.

Durrell[14] reports a study of the relationship between pre-adolescent growth cycle, reading, intelligence and sex. It was found that the more intelligent children of both sexes entered their cycle of development sooner than those with less intelligence and that girls entered the cycle earlier than boys.

Studies of retardation in reading indicate the superiority of girls. Durrell[15] reports that boys have much more difficulty in reading than do girls. Twice as many boys as girls were found to be retarded in reading when 6000 children were given the Durrell-Sullivan Reading Capacity and Achievement tests. Ten times as many boys as girls appear at the Boston University Educational Clinic for remedial instruction in reading. Munroe[16] found that 86% of the 415 disabled readers studied were boys. Of 69 cases of reading disability studied

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[13] Marjorie W. Carroll, "Sex Differences in Reading Readiness at the First Grade Level," Elementary English 25, 1948, pp. 370-75.

[14] Donald D. Durrell, Improvement of Basic Reading Abilities, New York, World Book Company, 1940. p.281.

[15] Ibid. p. 68.

[16] Marion Monroe, Children Who Cannot Read, Chicago, University of Chicago Press, 1932. p.205.

by Fernald,[17] 67 were boys. Girls were outnumbered 37 to 4 in cases reported by Young[18] of the Psycho-Educational Clinic at Harvard.

To explain the phenomenon of female superiority in reading, Olson[19] made longitudinal growth studies of children in Chicago. He maintains that growth manifests some unity when viewed as a whole. He suggests that sex differences in school achievement should be expected because of the general superiority of girls in reaching maturity. The importance of maturation is emphasized by Anderson and Dearborn[20] in a statement that 90% of girls mature at an age of 15½ years while boys are delayed until 17½.

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[17] Grace M. Fernald, Remedial Techniques in Basic School Subjects, New York, McGraw-Hill Book Company, Inc., 1943. p.205.

[18] Robert A. Young, "Case Studies in Reading Disability," American Journal of Orthopsychiatry, VIII, 1938. pp. 230-45.

[19] Willard C. Olson and Byron O. Hughes, "Growth of the Child as a Whole," The Psychology of Teaching Reading, New York, The Ronald Press, 1952. pp. 199-208.

[20] Irving H. Anderson and Walter F. Dearborn, The Psychology of Teaching Reading, New York, The Ronald Press, 1952. p. 69.

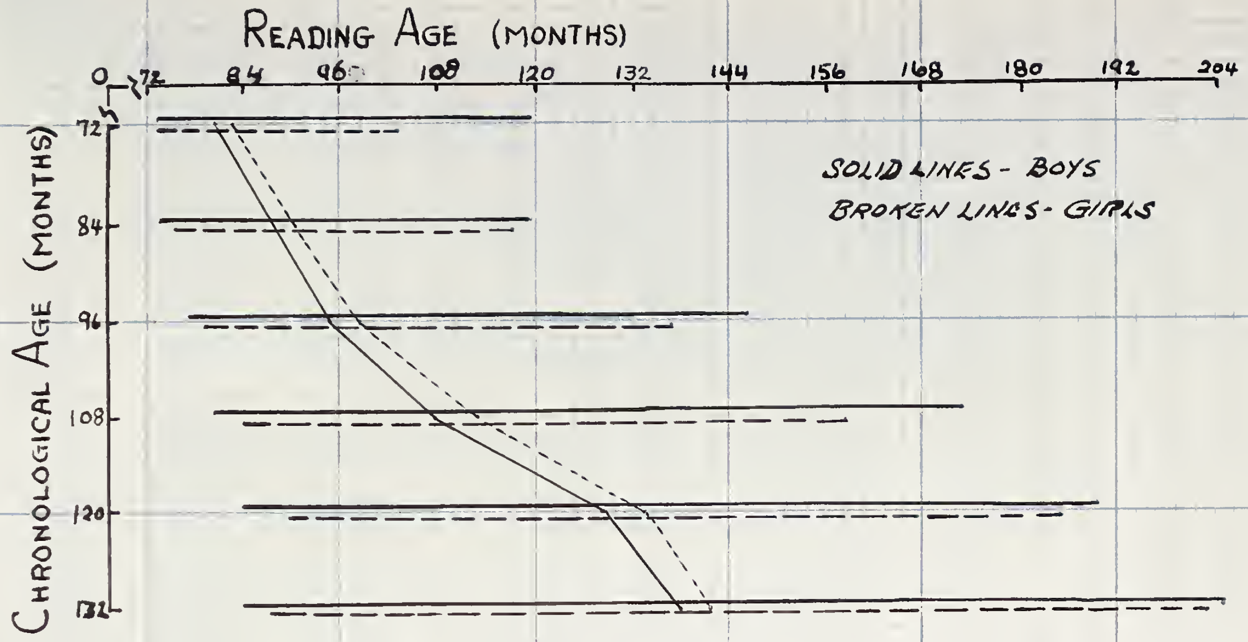

Fig. 1. DIFFERENCES IN READING AGE AMONG CHILDREN OF SUCCESSIVE CHRONOLOGICAL AGE GROUPS.

from - ANDERSON - DEARBORN - THE PSYCHOLOGY OF TEACHING READING, P. 42.

Anderson and Dearborn[21] report a study of reading achievement carried on in the Elementary School of the University of Michigan. Differences between boys' and girls' reading achievement are represented graphically in figure 1. Curved lines show the trend of the average scores while the horizontal lines indicate ranges of achievement. Girls appear to be slightly but consistently superior to boys. Results indicate that boys' scores are consistently more variable. Variability in reading scores increases with chronological age for both sexes.

One of the most extensive investigations of sex differences in reading achievement is reported by Stroud and Lindquist.[22] The Iowa Every-Pupil Testing Program of 1932-1939 and the Iowa Every-Pupil Basic Skills Testing Program of 1940 provide the data for several investigations. The findings related to reading achievement are summarized in Table III. The sample used represents a population far greater than the number indicated. Every tenth paper was selected for statistical treatment so the actual group tested was ten times the number used.

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[21] Irving H. Anderson,"Individual Differences in Reading Achievement," _The University of Michigan School of Education Bulletin_, XXI: pp. 17-20, Nov. 1949.

[22] J.B. Stroud and E. F. Lindquist, "Sex Differences in Achievement in the Elementary and Secondary Schools," _Journal of Educational Psychology, XXXIII_, 1942. pp. 657-667.

TABLE III

SEX DIFFERENCES IN SILENT READING ON THE 1940 IOWA EVERY-PUPIL TESTS OF BASIC SKILLS[23]

	Number		Mean Scores		Difference	Significance Ratio
	Boys	Girls	Boys	Girls		
Reading Comprehension						
Grade III	351	362	22.85	24.97	-2.12	2.57
IV	370	371	33.57	34.32	-2.75	3.38
V	346	374	38.30	39.59	-1.29	1.77
VI	432	455	29.60	29.90	-0.30	0.39
VII	533	541	34.64	34.74	-0.10	0.14
VIII	446	424	41.64	42.11	-0.47	0.50
Reading Vocabulary						
Grade III	351	362	18.62	20.22	-1.60	2.30
IV	370	371	25.99	28.20	-2.21	3.46
V	346	374	31.71	33.41	-1.70	3.37
VI	432	455	19.92	20.17	-0.25	0.44
VII	533	541	24.21	24.67	-0.46	0.85
VIII	446	424	29.81	31.05	-1.24	2.38

The minus sign of the mean differences indicate superiority of girls. For each grade tested, girls' mean scores were found to be superior to boys' for reading comprehension and vocabulary. When the differences are subjected to tests of significance, girls appear to be superior in reading comprehension in grades three and four. Significant differences favored the girls in reading vocabulary for grades three, four, five and eight. It may be noted that no significant difference appears at the grade seven level, the level at which the

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[23] Ibid., p.660.

Alberta study was conducted.

In the last two studies reported it would seem that differences between the sexes in reading achievement become smaller as you progress from the lower to the higher grades. The results of the Iowa Every-Pupil Tests of High School Achievement appear in Table IV.

TABLE IV

SEX DIFFERENCES IN READING ON THE 1940 IOWA EVERY-PUPIL TESTS OF HIGH SCHOOL ACHIEVEMENT[24]

Reading Test	N		$\bar{X}$		Difference	Significance
	Boys	Girls	Boys	Girls		
Comprehension	439	551	78.87	79.71	-0.81	0.74
Vocabulary	439	551	22.96	23.27	-0.31	0.57

The results summarized by Table IV would seem to indicate that significant differences between the sexes in reading ability disappear by the time the student reaches high school.

While it is generally accepted that girls are superior to boys in the elementary school in reading, Potter[25] found no sex differences in directional drawing, perceptual discrimination or

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[24] *Ibid.*, p. 661

[25] Muriel C. Potter, "Perception of Symbol Orientation and Early Reading Success," *Contributions to Education, No. 939*, New York, Teachers College, Columbia University, 1949. p.69.

or reading. McLaren[26] found no sex differences in reading comprehension or word recognition in a study of infant reading.

3. Reading Achievement and Bilingualism

"One child in every five, aged fourteen years or under, is of foreign-born or mixed parentage." This statement by Goodykoontz[27] indicates the prevalence of foreign-language influence in the United States. The French of southern Louisiana, the Scandinavians of the north middle states and the Spanish of the southwestern states remain, to some degree, unassimilated communities. In Canada, the French of Quebec, the Ukrainians of the prairies and the Doukhobors of British Columbia provide a somewhat similar situation. In Alberta, fairly representative samples may be found of such communities. In these areas, it would seem that bilingualism would be a factor to consider in evaluating scholastic achievement. In the sample with which this study is concerned, 7% of the grade seven pupils reported some language other than English as being the preferred language spoken in the home.

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[26] Violet M. McLaren, "Socio-Economic Status and Reading Ability - A Study in Infant Reading," Studies in Reading Volume 2, London, University of London Press, 1950. p.61.

[27] Bess Goodykoontz, "Elementary Education," School Life 24, 1939. p.228.

Bilingualism refers to the use of two languages by a person. Usually the first language is learned in the home while the second language is acquired outside.

With an increase in the use of standardized tests bilingualism as a factor affecting scholastic achievement, may be more readily measured.

One of the earliest studies of bilingualism was carried on by Saer, Smith and Hughes.[28] They were concerned chiefly with the effect of bilingualism on intelligence test scores. Children of five rural districts in Wales, equated for socio-economic status, formed part of the tested group. In addition, 1400 children from two large urban schools were tested. The Stanford Revision of the Binet and two additional versions of the same scale were administered. Questions were translated into Welsh so that the bilingual group might be tested in both English and Welsh. As a result of the investigation the authors concluded that ....

> "... monoglot English-speaking children in the rural districts of Wales showed a considerable and consistent superiority over the bilingual children in the same district. The most obvious factor that seems to account for this difference is the use of two languages before the power of using one effectively has been acquired."

Sanchez[29] in reviewing studies of Spanish-speaking children

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[28] D. J. Saers, "The Effect of Bilingualism on Intelligence," British Journal of Psychology, XIV, 1923. pp.25-282.

[29] L.S.Tireman, Teaching Spanish-Speaking Children, New Mexico, The University of New Mexico Press, 1951. p.23.

conducted between 1924 and 1930, found that they tested lower in intelligence than English-speaking children. He explained these differences by "social limitations, environmental influences and language handicap." Haught[30] attempted to find objective evidence of a language handicap. He assumed that if such a handicap existed, it should decrease as the pupil advanced in school. He gave intelligence tests to pupils in grades one to twelve but found no increase. Paschal and Sullivan[31] found that Spanish-speaking children were inferior to English-speaking children when results of performance tests were compared.

Sanchez[32] found that there were eighty-four words in the vocabulary of the Stanford Binet for years 3 to 8 that did not occur in the vocabulary of Spanish-speaking children of New Mexico. This fact would seem to be important in the interpretation of scores made on verbal tests of intelligence by non-English speaking children.

Pintner[33] tested 430 Bohemian, Italian and Jewish children in three New York schools. They were grouped as to English or non-English backgrounds. The Pintner-Cunningham and the Pintner-Non-Language Primary tests were given. The English group was found to

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[30] Ibid., p.23.
[31] Ibid., p.24.
[32] Ibid., p.19.
[33] Ibid., p.24.

be superior in the verbal tests. In two of the schools the non-English group did relatively better on the non-language tests while in the third no difference was found. He concluded that great caution must be exercised in comparing children of different language backgrounds when a verbal intelligence test is used.

In a study of 1152 Italian and 1196 Jewish children between the ages of nine and fourteen, Arsenian[34] found that bilingualism does not influence mental development.

Information regarding bilingualism as a factor of reading ability seems to be meagre. The studies noted in connection with the effect of two languages on measured intelligence indicate that tests of a verbal nature favor the monoglot English-speaking pupils.

4. Reading Achievement and Grade Placement

A review of studies relating to reading achievement in Alberta is difficult because of the scarcity of available data. The Department of Education, Province of Alberta, tests annually the students of grades IX and XII. As the tests used are not standardized the data obtained are not amenable to statistical comparison. One unpublished study found that there was no retrogression in reading achievement. A survey of reading achievement

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[34] *Ibid.*, p.25.

in grade six throughout the province shows a slight increase in achievement between the years 1947 and 1953.[35]

Carmichael's[36] study presents authoritative data relating to reading achievement in Alberta schools. She found that the grade four samples exhibited achievement in reading beyond their grade placement for urban, town and graded rural schools. The grade score norms of the California Reading Test for reading comprehension, reading vocabulary and total reading were used for comparison. At the grade seven level only the urban and town samples showed achievement beyond the grade placement at the time of testing.

It would appear that there is a need for the establishment of some agency to collect and make available for reference, accounts of the many local surveys and testing programs that are being carried on in various parts of the province. Past achievement is one of the best criteria with which to measure present progress.

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[35] Department of Education Files, 1953.

[36] A. Carmichael, "A Survey of Reading Achievement in Alberta Schools," The Alberta Journal of Educational Research, Vol. I, No. 1, March, 1955. pp. 18-33.

CHAPTER III

EXPERIMENTAL DESIGN

1. The Sample

This reading study is but a small part of a provincial survey of the language arts. The committee in charge of the project decided that a testing program in grades four and seven would provide a body of data that would be useful in determining achievement of Alberta students in fields relating to language. The selection of pupils to be tested met the demands of random sampling in that every person in the population had an equal chance of being drawn.[1]

In order to insure a balanced sample the province was divided into eight separate regions on the basis of geographic, climatic, socio-economic and language factors. From each of these areas one town was randomly selected in which the school population was between 250 and 1000.[2]

The selection of graded rural and ungraded rural samples from each of the eight divisions was roughly proportional to the total school population of the area.[3] Graded rural children were randomly chosen from classrooms in towns having a school population

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[1] Henry E. Garrett, "Statistics in Psychology and Education," 1951. P.223.

[2] Annual Report, Department of Education, 1951. Pp.119-120.

[3] A. Carmichael, A Survey of the Achievement of Alberta School Children in Reading, op. cit. P.19.

less than 250. Of these, only children who were actually rural residents were used. The ungraded rural sample was obtained by testing children of randomly-chosen school divisions in each of the eight typical areas. All pupils in the grades concerned were tested and their papers randomly chosen by Faculty of Education workers. Edmonton and Lethbridge were randomly chosen to represent the large urban and small urban populations respectively. In the urban centres grade four and seven classes were assigned numbers and selected for testing according to the table of random numbers.[4]

The original plan called for testing 2000 pupils in grades four and seven. The actual numbers used for the reading survey appear in Table V.

TABLE V

SAMPLE SIZES OF PUPILS PARTICIPATING
IN ALBERTA READING SURVEY

Sample	Grade IV	Grade VII	Total
Large Urban	196	197	393
Small Urban	150	149	299
Town	209	221	430
Graded Rural	215	161	376
Ungraded Rural	183	189	372
Totals	953	917	1870

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[4] E. F. Lindquist, Statistical Analysis in Educational Research, Boston: Houghton Mifflin Company, 1940, pp. 262-264.

Detailed instructions regarding the administration of the tests were sent to the various teachers, principals and superintendents in order that testing procedures would be uniform.

2. The Testing Instruments

In any testing program the selection of the testing instruments is of prime importance. Consideration must be given to the purposes of the program, the cost of test materials, the facility of administration and the validity of results obtained. With these criteria in mind, the California Short-Form Test of Mental Maturity, Elementary (1950 S-Form) as a measure of intelligence and the Elementary and Intermediate Forms AA of the California Reading Test as measures of reading achievement were chosen.

The authors of the California Test of Mental Maturity are Elizabeth T. Sullivan, Ph. D., Willis D. Clark, Ed. D., and Ernest W. Tiegs, Ph. D.. The authors claim to measure four factors involved in intelligence: spatial relationships, logical reasoning, numerical reasoning and verbal concepts useful in thinking. The authors state the major purpose of the test is "to provide information on the nature and organization of the abilities of a given pupil in order that that information may be used to guide his learning activities."[5]

The test is constructed to measure both language and non-language mental maturity. Although it is primarily diagnostic and analytical it

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[5] Manual, California Short Form Test of Mental Maturity (1950), p.2.

yields three mental ages: language, non-language and total; and three I.Q. scores: language, non-language and total.

In discussing the California Test of Mental Maturity, Garrett[6] indicates that validity is chiefly inferred, but a correlation of .88 with the Stanford-Binet Test is stated, for an unspecified level and range. No data are presented on the test's relationship to subsequent school achievement or to other appropriate criteria.

Cattell[7], in discussing the California Test of Mental Maturity, says,

> "These tests are exceedingly well designed from the point of view of adaptation to school needs and the convenience of the teacher. All the data regarding consistencies, standardization and correlation with school progress that one could reasonably demand, are clearly presented."

Kuhlmann's[8] criticism of the test points out that there appears to be little value in attempting to label mental functions until it is known how these functions enter into school achievement in different school subjects. The point is also taken that the non-language section of the tests are strictly non-reading sections as language cannot be

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[6] Henry E. Garrett, The Third Mental Measurements Yearbook , Oscar Buros, Editor, Rutgers University Press, 1949. P.224.

[7] Raymond B. Cattell, "Review of California Short-Form Test of Mental Maturity," The Nineteen Forty Mental Measurements Yearbook, Highland Park, N.J., Rutgers University Press, 1940. Pp. 1193-94.

[8] F. Kuhlmann, The Nineteen Forty Mental Measurements Yearbook, New Brunswick, N.J., Rutgers University Press, Highland Park, N.J., 1940.

eliminated as a factor in anything but performance tests.

It would appear that, despite the contradictory opinions regarding the test, its language and non-language composition, the ease with which it can be administered and marked, and its grade placement scores made it a satisfactory testing instrument.

Ernest W. Teigs, Ph. D., and Willis W. Clark, Ed. D., are co-authors of the California Reading Test, Elementary Form AA and the Californis Reading Test, Intermediate Form AA used in this survey. They describe their tests as instruments for, "accurately and objectively measuring pupil achievement in fundamental reading skills."[9] The test measures achievement in reading vocabulary under four sections: word form, word recognition, meaning of opposites and meaning of similarities. Reading comprehension is measured by tests in following directions, reference skills and interpretation of meanings. Standardization has been based on more than 50,000 cases at each test level and basic information for the age-grade norms has come from approximately one-half million pupils in twenty different states. The reliability coefficients of the reading forms in terms of grade placement are .93 for the elementary test and .92 for the intermediate test.

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[9] Manual, California Reading Test, p. 2.

As the authors give assurance that the California reading tests are but revised editions of the Progressive Reading Test, Witty's[10] remarks should apply.

> The Elementary Reading Test is especially well-adapted for survey and diagnostic purposes .... the results can be readily comprehended, interpreted and applied by classroom teachers.
> The tests in the Intermediate series appear to satisfy the criterion of validity.........at present these tests have no equal as practical survey and diagnostic instruments."

Observations by Flanagan[11] indicate that the authors have corrected most of the weaknesses pointed out by reviewers of the Progressive Reading Test. He suggests that additional information be provided regarding the reliability of the sub-scores and standard errors of measurement for sub-scores. The benefits of additional time for completion of the test is also a question that the authors might consider. Flanagan concludes his remarks with the statement:

> The California Reading Test is valuable for appraising the progress of pupils with respect to their important skills of vocabulary and comprehension.

The reading skills tested, the test material chosen and the manual organization meet with the approval of Hobson[12]. He suggests that the development of local norms might be advisable.

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[10] P. A. Witty, Third Mental Measurements Yearbook, 1941, p. 15.

[11] J. C. Flanagan, Fourth Mental Measurements Yearbook, 1953, pp. 568-570.

[12] Ibid, p.568.

Testing time for each of the tests discussed is:

California Short Form Test of Mental Maturity	47 mins.
California Reading Test, Elementary Form AA	35 mins.
California Reading Test, Intermediate Form AA...........	58 mins.

In view of the fact that each of the California tests requires less than an hour to administer it appears that they meet the criterion of time economy. The organization of material and provision of diagnostic or analytic features make them especially valuable to the teacher or administrator. It would seem therefore, that these testing instruments satisfy the demands of the survey.

3. Experimental Design

With the completion of the testing, all papers were returned to the University of Alberta where the Faculty of Education arranged to have them marked and the results recorded. Results were recorded on data assembly sheets and individual results were compiled and recorded for each pupil tested.

The relationship between Total I.Q. and Total Reading scores was determined by the calculation of the product-moment coefficients of correlation. The data used were drawn from five stratified samples of grade seven Alberta pupils. In order to evaluate the reliability of the coefficients of correlation obtained they were tested against the null hypothesis.[13] Computed t-values were used to determine

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[13] Henry E. Garrett, op. cit., p. 299.

significance of differences between coefficients of correlation.[14]

Comparison of boys and girls of grade VII in intelligence and reading achievement was made on the basis of 400 randomly-chosen scores. Frequency distributions were compiled for the Total I.Q. and Total Reading scores. The arithmetic means, standard deviations, and standard errors were computed.

The significance of mean differences between boys' and girls' scores was tested by computing the mean differences, the standard errors of the differences,and the critical ratios. To test the significance of the computed critical ratios reference was made to a table of significance of statistics of small samples. The null hypothesis was retained for critical ratios less than 2.58 at the .01 level of confidence and for critical ratios less than 1.96 at the .05 level.

Variability from sample to sample was determined by the calculation of standard deviations, differences in standard deviations and critical ratios obtained from these differences. Critical ratios were subjected to the test of the null hypothesis for significance of difference. Bilingual samples were compared in a similar manner.

The means and standard deviations of each sample in grades

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[14] Ibid., p. 190.

IV and VII were combined for reading vocabulary totals, reading comprehension totals and total reading. The corresponding grade score for each mean score was determined from the test manuals. The yearly increment was computed by dividing the grade score obtained by the grade level at time of testing. Data regarding mean scores and standard deviations were obtained from a composite of findings by Carmichael.[15]

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[15] A. Carmichael, op. cit., chapters V-VII.

CHAPTER IV

READING ACHIEVEMENT AND INTELLIGENCE

A relationship between reading ability and intelligence has long been recognized. Dolch says, "The strongest single factor in the pupil's success in reading is undoubtedly his degree of intelligence."[1] Many investigations have shown that a positive correlation exists between reading achievement and intelligence test scores. This study attempts to obtain some measure of the degree of this relationship for Alberta students. The total reading scores and total I.Q. scores of grade VII pupils of each Alberta sample were used to compute five separate coefficients of correlation.

The coefficients of correlation between reading achievement scores and intelligence test scores range from +.67 to +.81. The computed coefficients of correlation and corresponding probable errors of the coefficient appear in Table VI for each of the five samples tested. The coefficients of correlation obtained range from .67 for the small urban sample to .81 for the large urban sample. Strang[1] found coefficients of correlation ranged from .799 to .844 when she used only the I.Q. scores obtained from the language factors of the mental test. When she used the I.Q. scores based on

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[1] E. W. Dolch, op. cit. P.139.

non-language factors her coefficients of correlation between I.Q. and silent reading ranged from .359 to .557.

TABLE VI

CORRELATION BETWEEN READING ACHIEVEMENT AND
INTELLIGENCE OF FIVE SUB-SAMPLES OF
GRADE VII ALBERTA STUDENTS

Sample	N	r	PE_r
Large Urban	196	.81	0.02
Small Urban	145	.67	0.03
Town	218	.74	0.02
Graded Rural	190	.69	0.03
Ungraded Rural	185	.71	0.03

The reliability of a coefficient of correlation may be tested against the null hypothesis that the computed coefficient does not depart significantly from zero. Using the formula,

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}}$$

, where r represents the coefficient of correlation and N is the size of the sample,[2]

the t-values of Table VII were computed.

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[2] Henry E. Garrett, Statistics in Psychology and Education, New York, 1947. P. 298.

TABLE VII

RELIABILITY OF CORRELATION COEFFICIENTS WHEN TESTED AGAINST THE NULL HYPOTHESIS

Sample	t	Level of Significance
Large Urban	19.24	.01
Small Urban	10.79	.01
Town	16.17	.01
Graded Rural	13.07	.01
Ungraded Rural	13.64	.01

Entering a table of t[3] with these t-values the coefficient of correlation in each case is found to be significant at the .01 level. It would appear that the null hypothesis is rejected, and that the obtained coefficients of correlation are highly significant in their departure from zero.

As a test of the reliability of the difference between coefficients of correlation, the significance of the difference between coefficients was computed. The formula used was,

$$t = \frac{Z_1 - Z_2}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

, where N_1 and N_2

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[3] Henry E. Garrett, Ibid. p. 190.

represent the respective sample sized, and where $Z = \frac{1}{2} \log_e \frac{1 + r}{1 - r}$.

By a comparison of the t-values obtained with those of the table of t, it is possible to test the hypothesis that the five sample values of r are drawn from the same population. Table VIII reveals significant differences between large urban and small urban samples at the .01 level of confidence.

TABLE VIII

COMPARISON OF COEFFICIENTS OF CORRELATION BY THE USE OF FISHER'S Z-FUNCTION

	Large Urban	Small Urban	Town	Graded Rural
Ungraded Rural	2.4*	0.73	0.6	0.4
Large Urban		2.91*	1.0	2.75*
Small Urban			1.27	0.36
Town				1.01

*Significant at the .01 level.

A similar significant difference may be noted between the large urban and graded rural samples. As all five samples were randomly drawn from the grade VII Alberta population, any difference in the relationship between intelligence and reading achievement of the above samples would normally result from causes other than those of sampling.

Summary of Findings

1. Relatively high positive correlations are found to exist between intelligence test scores and reading achievement test scores for each of the five samples of grade VII Alberta students. An average of the five coefficients of .72 appears to indicate a significant relationship between the scores obtained on the California Short-Form Test of Mental Maturity and the California Reading Test.

2. The computed coefficients of correlation are found to be highly significant at the .01 level when tested against the null hypothesis.

3. Significant differences appear to exist between the obtained coefficients of correlation of the large urban and small urban samples as well as between the large urban and graded rural samples. These differences do not appear to be attributable to sampling errors. Differences in school organization, administrative and supervisory practices, instructional procedures or subject emphasis may account for the range of correlation coefficients. The finding indicates that the subject warrants further study.

CHAPTER V

SEX DIFFERENCES

A review of the literature regarding sex differences reveals a superiority of girls in language arts. On the basis of the superiority displayed by girls in reading readiness tests, Anderson and Dearborn[1] suggest that the general factor of rate of maturity is at work favoring girls and not a matter of specific language entities. The additional fact that differences appear early and tend to disappear as the child grows older lends further support to the contention.

1. The Sample

"The criterion of randomness in a sample is met when every person in the population from which the sample has been drawn has had an equal chance of being chosen."[2] In this study all the grade VII students tested were assigned numbers. Using Lindquist's [3] table of random numbers 200 boys and 200 girls were selected for the sample which was to be used in the study of sex

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[1] Irving H. Anderson and Walter F. Dearborn, The Psychology of Teaching Reading. New York, The Ronald Press, 1952, p.35

[2] H. E. Garrett, op. cit., p. 223.

[3] E. F. Lindquist, op. cit., pp. 262-264.

differences.

2. Intelligence

Research seems to indicate that no significant difference in intelligence exist between the sexes. In a survey of 874 children Rusk[4] found no appreciable differences in mean scores in intelligence. Though the present study is mainly concerned with differences in reading, intelligence is an important factor in the measurement of achievement.

The selection of subjects in the present study was made to conform to the criteria of randomness. It would seem that the findings might be considered to be valid for the Alberta grade VII population. The total I.Q. scores obtained on the California Short-Form Test of Mental Maturity, Elementary, 1950, S-Form was used for comparison.

A comparison of the mean scores of boys and girls appears in Table IX.

TABLE IX

COMPARISON OF MEAN SCORES IN INTELLIGENCE AND READING OF GRADE VII BOYS AND GIRLS

	N	Total I.Q.	Total Reading
Boys	200	102.90	91.85
Girls	200	103.78	93.65

A mean difference of 0.88 exists between boys' and girls'

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[4] R.R. Rusk, "The Intelligence of Scottish Children," Thirty-Ninth Yearbook of the National Society for the Study of Education, Part II, Chicago, 1940. Pp. 269-73.

I.Q. scores. For total reading scores a mean difference of 1.80 was found between the sexes. To determine whether these differences were significant the critical ratios were computed. Table X contains the findings.

TABLE X

SIGNIFICANCE OF DIFFERENCES OF MEAN SCORES IN INTELLIGENCE AND READING OF GRADE VII BOYS AND GIRLS

Scores	D	SE_D	CR	Level of Significance
Total I.Q.	0.88	1.37	0.64	not significant
Total Reading	1.80	1.71	1.05	not significant

Entering the table of t[5] it may be seen that a t-value of 1.97 is necessary before the difference may be considered significant at the .05 level. As the computed t-value is 0.64 it may be concluded that no significant difference exists between the mean total I.Q. scores of Alberta boys and girls as measured by the California Test of Mental Maturity.

The differences in Total I.Q. scores is shown graphically in the cumulative percentage curves in Figure 2. Though the differences are insignificant it is interesting to note the variations that occur. Girls show a slight superiority in the I.Q. range from 72 to 97. Practically no difference is shown from 97 to 112 but the number of boys attaining I.Q. scores above 112 is greater than girls.

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[5] Henry E. Garrett, op. cit. P.190.

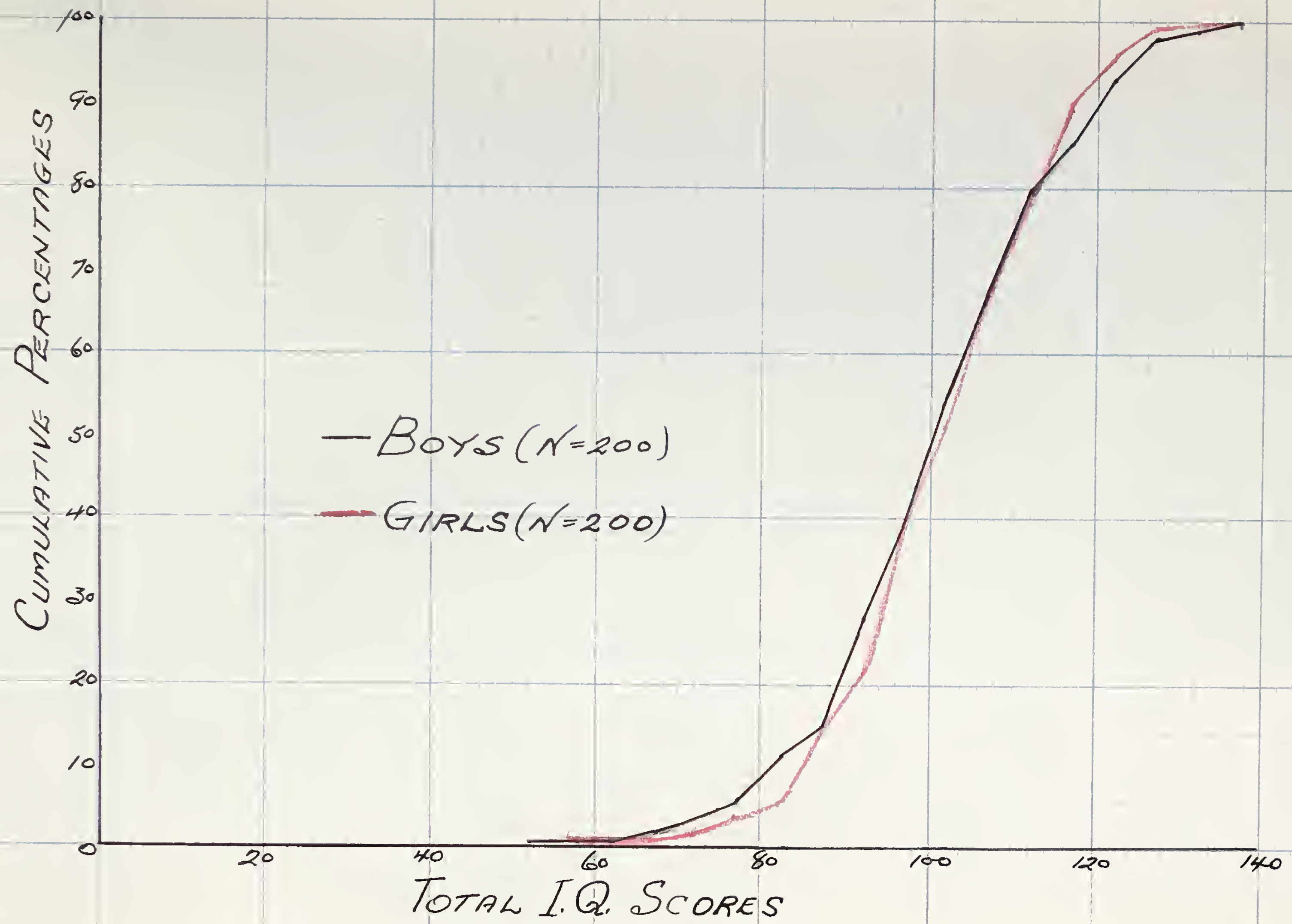

Fig. 2. Distribution of Total I.Q. Scores attained by random samples of Alberta Boys and Girls in Grade VII

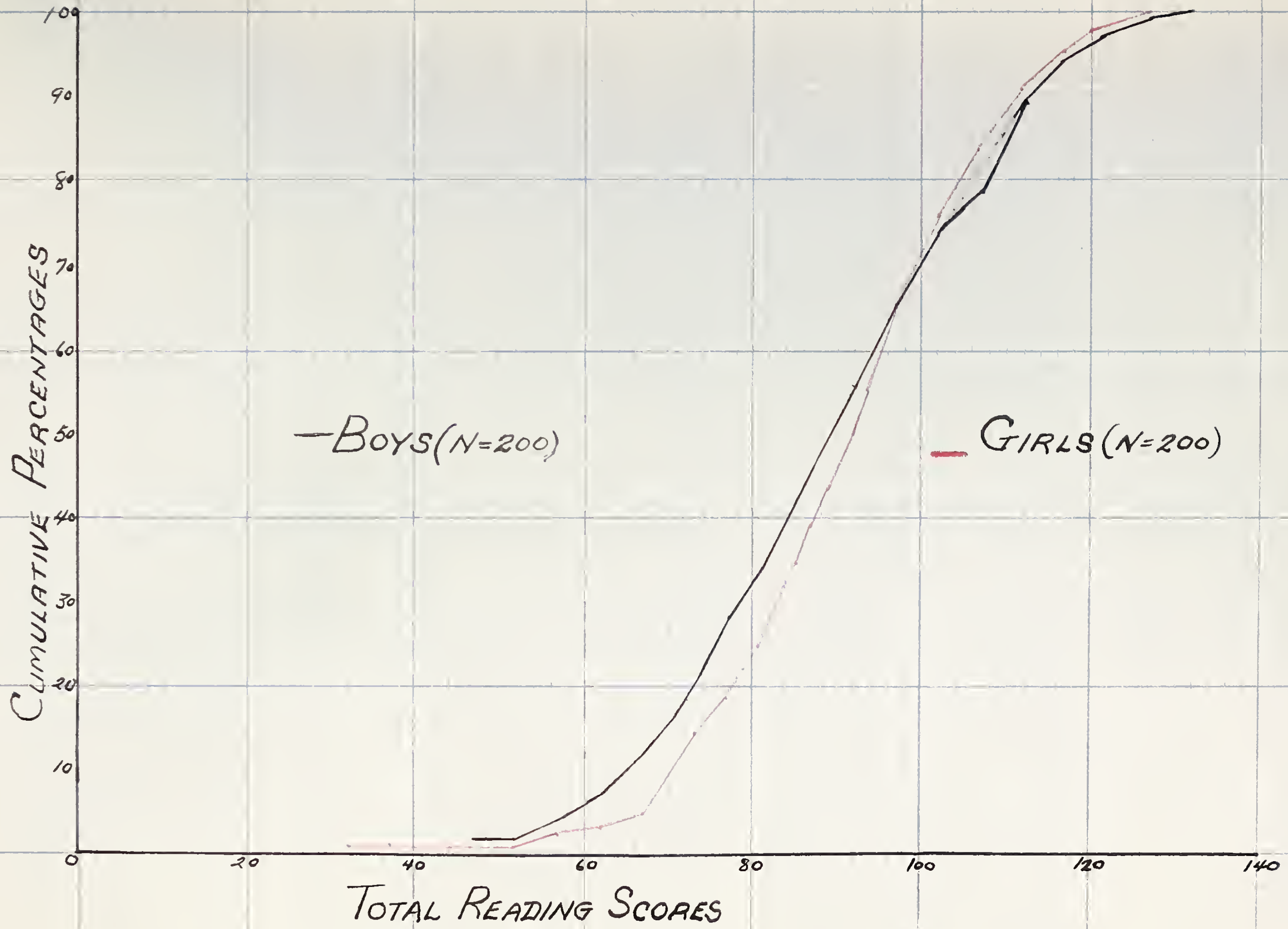

Fig. 3 Distribution of Total Reading Scores attained by random samples of Alberta Boys and Girls in Grade VII

The fact that the California Short-Form Test of Mental Maturity contains verbal features may account for the slight, but insignificant, superiority evinced by girls in this survey.

3. Achievement in Reading

Research indicates that girls exhibit greater facility than boys in language usage, spelling, handwriting and reading[6]. Reid[7] found that grade VII Alberta girls achieved mean scores which were significantly higher than those of the boys when tested with the California Language Test. Common factors of language are present in tests of reading and language. This study found no significant difference between the mean scores of boys and girls on the California Reading Test.

Table X shows a sex difference in mean total reading scores of 1.80. The graphical representation of reading achievement for the sexes appears as ogive curves in Figure 3. It may be noted that the girls' lowest score is 15 points below that of the boys' and the boys' highest score surpasses the girls' highest score by 5 points. The

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[6] Willard C. Olson, Child Development, Boston: D.C.Heath and Company, 1949.

[7] T. J. Reid, *op. cit.*, p. 53.

distribution shows that a slight numerical superiority is displayed by girls up to the score of 97, at which point the boys show a slight superiority. The similarity between Figures 2 and 3 would seem to lend support to the thesis that the common element of reading ability exerts an influence in the measurement of both intelligence and reading achievement, when verbal factors are present in each.

To determine the significance of the difference in mean total reading scores the critical ratio was found to be 1.05. Reference to a table of t reveals that a t-value of 1.97 is necessary to make a difference significant at the .05 level. It would appear that, in this study of reading achievement, no significant difference between the sexes is evident.

4. Variability

Assuming that the size of the boys' and girls' samples is large enough to ensure the reliability of the means of both tests, the factor of variability of the measures about the mean must be considered. An increase in the standard deviation indicates a decrease in reliability.

The test authors state that a median I.Q. of 100 was set for grade VII on the California Short-Form Test of Mental Maturity with a standard deviation of 16 points. Table XI shows standard deviations of 14.53 and 12.88 for Alberta boys and girls respectively. As the standard deviation is less than that of the standardization group it would appear that the computed means for the Alberta samples may be

TABLE XI

COMPARISON OF STANDARD DEVIATION FOR BOYS AND GIRLS

	N	Total I.Q.	Total Reading
Boys	200	14.53	18.24
Girls	200	12.88	15.82

considered to have a comparable reliability.

A critical ratio of 1.70 was obtained when the significance of the difference between standard deviations of total intelligence scores of boys and girls was tested. A critical ratio of 1.97 would be necessary before the factor of variability would have a significant effect upon the reliability of the computed means.

When the same test is applied to the differences between standard deviations of reading scores the result differs. Reference to Table XII shows a critical ratio of 2.00. Garrett's Table 29 indicates that a critical ratio of 1.97 is significant at the .05 level of confidence.

TABLE XII

SIGNIFICANCE OF DIFFERENCE BETWEEN STANDARD DEVIATIONS FOR BOYS AND GIRLS

Scores	D	SE_D	CR	Level of Significance
Total I.Q.	1.65	0.97	1.70	Non-significant
Total Reading	2.42	1.21	2.00	.05

The computed critical ratio of 2.00 therefore may be considered significant. The reliability of the differences in mean scores in reading appear to be less secure than those of intelligence scores.

To test the significance of the difference between means when the variances are not homogeneous the approximate method described by Johnson[6] was applied. A critical ratio of 1.05 was computed which is not significant at the .05 level. This finding would seem to reaffirm the validity of the computed means as measures of central tendency despite the presence of heterogeneity among the variance.

The conclusion that no significant difference exists between boys' and girls' total reading scores may be safely retained.

Summary of Findings

1. A comparison of mean total I.Q. scores of boys and girls reveals no evidence of a significant difference. The mean total I.Q. scores on the California Short-Form Test of Mental Maturity were 102.90 and 103.78 for grade VII boys and girls respectively. The mean difference was found to be non-significant.

2. A graphical representation of the I.Q. scores indicates little difference exists between the sexes within the I.Q. range 90 to 100. Girls show a slight superiority in number below this range while boys appear in slightly greater numbers above this

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[6] Palmer O. Johnson, Statistical Methods in Research, 1949. Prentice Hall, New York. Pp. 74-5.

range. Such slight differences may be attributed to sampling errors but constitute an insight which would justify more intensive investigation.

3. No significant difference was found between the sexes when the mean total reading scores were compared. Reading achievement, as measured by the California Reading Test, placed the grade VII boys' mean total reading score at 91.85 and girls' at 93.65. The usual test of the significance of difference between means yielded a critical ratio of 1.05 which is not significant at the.05 level of confidence. Additional tests of the reliability of the mean difference in which standard deviations differ in magnitude, corroborate the results of the first test.

4. Graphical representation of total reading scores indicates that girls appear in greater number for scores below 97 while more boys' scores are evident above 97. Reference to the grade placement and age norms chart of the California Reading Test shows a total reading score of 97 as normal for a pupil of C.A. 146 months and M.A. 146 months. While the obtained differences are not significant they furnish an hypothesis which would justify further investigation.

5. A difference in the standard deviations of intelligence scores of 1.65 results in a computed critical ratio of 1.70. A t-value of this size may be considered as insignificant. The calculated means would appear to be unaffected by variability.

6. A difference does exist in the variability of reading

scores as between boys and girls. The standard deviation of boys' scores is 18.24; for girls' 15.82. A computed critical ratio of 2.00 is significant at the .05 level of confidence. The application of the Cochrane and Cox method for testing the significance of mean differences reveals a non-significant critical ratio of 1.05. The means may therefore be accepted as computed.

CHAPTER VI

BILINGUALISM

Bilingualism has been recognized as a factor in the measurement of scholastic achievement. Various studies undertaken in Alberta offer evidence that bilingual pupils suffer a handicap when tested by verbal tests in English. An understanding of the English language must be a factor when considering reading achievement. Reid[1] found that pupils from English homes showed significant superiority over bilingual pupils when langauge achievement was measured. Research among the polyglot populations of the eastern United States presents conflicting evidence as to the effect of bilingualism in scholastic achievement. The studies of Spanish-speaking pupils of southwestern areas of the United States would indicate that the bilingual student is at a distinct disadvantage in any testing program demanding verbal responses.

1. The Sample

Language studies indicate that the bilingual factor decreases in importance as a pupil proceeds from grade one to grade twelve. In view of this observation the grade seven sample was chosen for study because of its intermediate position.

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[1] T. J. Reid, op. cit., p. 73.

A random sample of 200 pupils who listed English as the preferred language was selected from the grade seven population by the method described in Chapter V. It was found that of the 917 grade seven candidates only 131 listed a language other then English as the preferred language spoken in the home. All of the non-English pupils were used for comparison. The sub-samples number as follows: English, 200; French, 36; Ukrainian, 36; Others, 59. Comparisons were made between the English and the total Non-English groups.

The validity of the findings is limited by the following factors:

1. The size of the samples. The English subsample numbered 200 while the bilingual sub-sample numbered 131.
2. The fallibility of the evidence of bilingualism. Reports on the language spoken in the home were accepted as indicated by the pupils on their Personal Data sheets.

2. Intelligence

Any survey of reading achievement must necessarily include a consideration of intelligence as a factor. The sample selected for the bilingual study reveals certain differences in measured

intelligence that are summarized in Table XIII below.

TABLE XIII

COMPARISON OF I.Q. MEAN SCORES OF GRADE VII MONOGLOT AND BILINGUAL PUPILS

Sample	$\overline{X}$	SD	SD_M
English	105.10	12.66	0.90
Bilingual	95.44	13.09	1.14

It will be noted that the difference between means is 9.66. A difference of this magnitude demands closer attention. To determine the significance of the mean difference the critical ratio was computed.

TABLE XIV

SIGNIFICANCE OF DIFFERENCE OF TOTAL I.Q. MEAN SCORES OF MONOGLOT AND BILINGUAL PUPILS

Scores	D	SE_D	CR
Total I.Q.	9.66	1.45	6.66

Calculation of the critical ratio for the English and the Bilingual samples results in a t-value of 6.66. This value is found to be highly significant at the .01 level of confidence.

Common experience is supported by these findings to the effect that intelligence tests containing verbal items favor pupils who are familiar with the language involved.

3. Achievement in Reading

Consideration of Table XV reveals that somewhat similar results obtain in reading achievement.

TABLE XV

COMPARISON OF READING MEAN SCORES OF GRADE VII MONOGLOT AND BILINGUAL PUPILS

Sample	$\overline{X}$	SD	SD_M
English	95.35	15.49	1.09
Bilingual	83.75	17.97	1.57

In reading achievement the monoglot sample manifests a superiority of 11.60 over the bilingual group.

In order to determine the significance of the differences that appear between the means of the English and Bilingual samples the critical ratios were computed and are summarized in Table XVI.

TABLE XVI

SIGNIFICANCE OF DIFFERENCE OF MEAN TOTAL READING SCORES FOR ENGLISH AND BILINGUAL SAMPLES

Scores	D	SE_D	CR
Total Reading	11.60	1.92	6.04

A mean difference of 11.60 in reading achievement between the samples gives rise to a critical ratio of 6.04. A t-value of this size is found to be highly significant at the .01 level of confidence.

4. Variability

No statistical examination of data is complete without a statement about variability. The standard deviations obtained for each sample in reading and intelligence appear in Table XVII. It may be noted that standard deviations of 12.66 and 13.09 for the English and Bilingual samples respectively are well within the published 16 points declared by the authors of the California Short-Form Test of Mental Maturity[2].

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[2] Manual, California Short Form Test of Mental Maturity 1950, S. Form, p. 2.

TABLE XVII

COMPARISON OF STANDARD DEVIATIONS FOR ENGLISH AND BILINGUAL SAMPLES

Sample	N	Total I.Q. SD	Total Reading SD
English	200	12.66	15.49
Bilingual	131	13.09	17.97

In order to determine whether the variability factors affected the reliability of the computed means of the Total I.Q. scores and the Total Reading scores, the significance of the difference of standard deviations was computed. The results are summarized in Table XVIII.

TABLE XVIII

SIGNIFICANCE OF DIFFERENCE OF STANDARD DEVIATIONS FOR TOTAL I.Q. AND TOTAL READING SCORES OBTAINED BY ENGLISH AND BILINGUAL PUPILS

Scores	D	SE_D	CR
Total I.Q.	0.43	1.03	0.42
Total Reading	2.48	1.35	1.84

A critical ratio of 0.42 for Total I.Q. and 1.84 for Total Reading are found to be non-significant. It would appear that variability does not affect the reliability of the computed mean scores. The means may be accepted within the limits of their stated standard error.

5. Summary of Findings

1. A comparison of mean total I.Q. scores of Alberta pupils, grouped according to the language spoken in the home, reveals that significant differences exist. The mean total I.Q. scores of the English sample was found to be significantly superior to the computed score of the bilingual group.

2. The English sample evidenced significantly superior achievement over the bilingual sample when the mean total reading scores were compared.

3. No significant difference was found between standard deviations of the samples for Total I.Q. or Total Reading.

CHAPTER VII

READING ACHIEVEMENT AND GRADE PLACEMENT

The status of reading achievement of Alberta students has been compared by Carmichael[1] on the basis of the norms of the California Reading Tests. Data regarding means and grade scores from her study are summarized in Table XIX.

TABLE XIX

READING ACHIEVEMENT OF GRADE FOUR AND SEVEN ALBERTA STUDENTS

	Urban $\bar{X}$	Town $\bar{X}$	Graded Rural $\bar{X}$	Ungraded Rural $\bar{X}$
Grade Four				
Vocabulary Total	71.72	70.42	67.35	62.60
Vocabulary Grade Score	5.65	5.54	5.11	4.75
Comprehension Total	26.50	26.31	24.17	22.52
Comprehension Grade Score	5.79	5.64	5.42	4.98
Total Reading	98.17	96.71	91.35	85.61
Total Reading Grade Score	5.75	5.62	5.35	4.85
Grade Seven				
Vocabulary Total	59.61	57.93	55.9	52.24
Vocabulary Grade Score	8.3	8.06	7.8	7.52
Comprehension Total	35.61	36.11	33.84	31.81
Comprehension Grade Score	8.2	8.31	7.82	7.43
Total Reading	95.31	93.8	89.89	83.72
Total Reading Grade Score	8.3	8.8	7.85	7.53

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[1] A. Carmichael, "A Survey of Reading Achievement in Alberta Schools," The Alberta Journal of Educational Research (March,1955), pp. 18-33.

By combining the computed means of each section of the sample a non-statistical comparison may be made of the equivalent grade scores of the various sections of the reading study. A composite mean represents the achievement of Alberta students in reading. Naive comparisons may be made between sub-samples in terms of grade placement, educational increment and rate of growth in reading achievement.

1. Grade Placement

Data from Carmichael's study appearing in Table XX show grade scores as equivalents of the computed mean scores. At the time of testing the actual grade placement of the grade four sample was 4.9 and of the grade seven sample 7.9. It may be noted that of the grade four sub-samples the Ungraded Rural sample, only, shows a slight inferiority in mean grade scores for Vocabulary and for Total Reading. In the grade seven sub-samples slight inferiority to normal achievement is exhibited by only Graded Rural and Ungraded Rural samples in each of the sections of the reading test.

In order to obtain a general picture of reading achievement, the means of sub-samples were combined for each section of the test and grade placement equivalents determined. A summary of the findings appear in Table XXI.

TABLE XX

COMBINED MEANS, STANDARD DEVIATIONS
AND CORRESPONDING GRADE SCORES
OF ALBERTA READING SCORES

Test	Grade	M	SD_M	Grade Score in years	Average Yearly Increment
Reading Vocabulary Total	IV	68.7	12.15	5.2	1.06
	VII	57.03	11.64	7.9	1.0
Reading Comprehension Total	IV	25.17	6.16	5.4	1.1
	VII	34.65	7.61	7.8	.99
Total Reading	IV	93.90	15.91	5.3	1.08
	VII	91.61	18.19	7.9	1.0

Observation of the data for the grade four sample indicates that achievement is somewhat superior to the normal for the grade placement. Grade seven achievement would seem to be quite normal except for a slight inferiority in reading comprehension. Yearly progress in reading would appear to be quite normal. Gains in achievement from grade four to grade seven are shown in Table XXI .

TABLE XXI

GROWTH IN READING ACHIEVEMENT IN TERMS OF GRADE
PLACEMENT FROM GRADE FOUR TO GRADE SEVEN

Reading	Grade IV	Grade VII	Growth
Vocabulary	5.2	7.9	2.7
Comprehension	5.4	7.8	2.4
Total Reading	5.3	7.9	2.6

The gain in terms of grade score in each of the sections of the test is less than 3 years. It would appear that a deceleration in reading achievement takes place from grade four to grade seven.

Summary of Findings

1. Reading achievement of the grade four Alberta sample was found to be superior to the test norms in terms of grade scores.

2. Grade seven achievement in reading vocabulary and total reading was found to equal the grade placement of the testees.

3. In reading comprehension the grade seven sample was slightly inferior to the normalizing group of the California Reading Test.

4. The yearly gain for the grade four sample was 1.06 years for reading vocabulary, 1.1 years for reading comprehension and 1.08 years for total reading.

5. The grade seven sample made normal yearly progress in reading vocabulary and total reading.

6. In reading comprehension the average gain per year for the grade seven sample was .99 year.

7. On the basis of a non-statistical approach, there seems to be some evidence of a deceleration in reading growth between grade four and grade seven.

CHAPTER VIII

CONCLUSIONS

The purpose of this survey was to organize a body of data sufficient to make observations regarding reading achievement of Alberta pupils in regard to intelligence, sex, bilingualism and grade placement. A summary of conclusions follows.

1. A significant relationship between reading achievement and intelligence exists. High positive correlations of from .67 to .81 were obtained when pupils' abilities were compared using scores on the California Short-Form Test of Mental Maturity and the California Reading Test, Intermediate, Form AA.

2. Examination of the relationship between intelligence and reading achievement indicates that factors are present which produce significant differences between certain of the coefficients of correlation. Correlation coefficients for the large urban sample were significantly greater than those of the small urban, the graded rural, or the ungraded rural samples.

3. Measurement by the California Short-Form Test of Mental Maturity reveals no significant sex differences in intelligence of Alberta children.

4. No significant sex differences in reading achievement of Alberta pupils exist when measurement is made by the California Reading Test, Intermediate, Form AA. This is noteworthy since it is at variance with earlier research findings.

5. In the measurement of reading achievement of boys and girls significant differences in variability do not limit the reliability of the computed mean scores.

6. Children from homes in which English was the preferred language were found to score significantly higher on tests of intelligence than from bilingual homes.

7. A comparison of English and Bilingual samples for reading achievement favors the pupils from monoglot homes in which English is the language spoken.

8. Reading achievement for the Alberta grade four sample is superior to the norms of the California Reading Test, Form AA, in terms of grade scores.

9. The Alberta grade seven sample equalled the reading achievement that might be expected, in terms of grade score norms of the California Reading Test.

10. On the basis of a naive examination of grade scores of Alberta pupils a deceleration in growth of reading ability is indicated between grades four and seven.

CHAPTER IX

IMPLICATIONS

The data contained in this study and the derived conclusions give rise to the following implications.

1. The high correlation between intelligence and reading achievement indicates a common factor of language is present. Pupils with reading or language disabilities suffer a disadvantage in such measurement. A non-verbal or performance intelligence test might be used to supplement results of verbal intelligence tests of the reading deviate or of the bilingual pupil.

2. Measures of mental maturity may serve as a guide to the reading potential of a student.

3. As no significant differences in reading achievement were found between boys and girls, comparable achievement should be expected in the classroom. Further research in the fields of interest, motivation and subject matter might reveal sex differences of importance to instructional procedures.

4. Since bilingual children suffer a very definite handicap in reading, a program of remedial reading appears to be needed. The selection of reference books and supplementary reading material must be influenced by the disabilities of the bilingual child. Books that appeal to the child of a certain

chronological age are written in simplified language so that they may be read by a child with a much lower reading age.

5. Adult education of non-English parents should effect a reduction in the number of homes in which English is not spoken.

6. The problem of bilingualism and scholastic achievement requires further study.

7. Research is needed to determine the causes of the apparent deceleration in reading growth between grades four and seven.

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